FLOAT SELECTION AND FINE TUNING YOUR FLOAT PLANE SET-UP

It won't be long until it's time for Float Flying. As you may have observed, at last year's Float Fly-In, only a few planes flew off the water well, some had difficulty getting off the water, and some did not get off the water at all. I had two planes at the Float fly-In last year. One fell into the "having difficulty' category, while the other made like a boat. After my experience I was determined to get my airplanes to fly off the water properly. I started doing what I should have done last year, reading everything I could find on Float flying and Float set-up. Of most help to me were the articles entitled "Basics of Float Flying" by John Sullivan, September, 1987 Model Airplane News magazine; and "Building Floats and Flying" by Chuck Cunningham, July, 1991 RC Modeler magazine. Not all articles agreed on how to determine every point below, however, they do all agree that every point is important, and should be addressed, if you wish to experience hassle free Float Flying. For those starting out, or experiencing some difficulty getting off the water this information will allow you to tackle your Float project with confidence. I followed these steps below for my Super Stick, Stick 40 Trainer and Telemaster 40. Each plane flew off the water gracefully the first try.

1. FIRST CHECK THE ENGINE SIZE ON YOUR POWER PLANE
Will the engine on your Float plane be able to handle the extra weight of the Floats, the landing gear, and the additional drag of the Floats on the water? If the plane you plan to use for Float flying can take off grass at 3/4 throttle without straining it should fly off the water properly. If in doubt replace it with the next larger size engine. Going back and checking my Kadet Senior that fell into the "not getting off the water" category, I found that it failed this check. It would not take off grass at 3/4 throttle.

2. YOU MUST SELECT FLOATS THAT ARE PROPERLY SIZED TO YOUR AIRPLANE
Be careful about opening a catalog and buying a set of Floats based on the engine or plane size. I did this for my first venture with flying off water and I had some setbacks. I build my planes heavy. I replace a lot of the Balsa supplied in the kit with plywood, I reinforce here and there, sometimes I even Balsa the fuselage vs.using Monocote and I do not spare the Epoxy. In one instance the Floats were marginal and in the other instance the Floats were too long. In the
marginal case (Floats too small) the Floats sat deep in the water and while turning into the wind to take off, the Float on the outside of the turn went under water dipping the wing into the water. The long Floats supported the airplane fine but prevented the airplane from rotating backwards enough and the plane would not leave the water. So how do you size your Floats to fit your model airplane? The best way to do this is to multiply the fuselage length (prop washer to rudder hinge line) times .80.

**FUSELAGE LENGTH X .80 = FLOAT LENGTH**

When checking my Super Stick I found the Floats were too long. I cut the Floats to the length indicated by the above formula. I had to shorten the Floats by only 4 inches: 2 inches off the bow and 2 inches off the stern. That's all it took to make my Super Stick leave the "having difficulty" category to flying off the water properly. You now have the proper Float length for your model airplane. Now before you purchase or start building your Floats you need to check one more thing. With the Float step located at the C.G. of the model airplane, the Float bow (front tip) should extend past the prop at least 2 (two) inches. This will prevent the front of the Float from going underwater when you advance the throttle quickly. Figure 1 shows the fuselage length measurement, identifies the Float step, illustrates the Float step/fuselage set-up, and the Float tip/prop placement.

3. **PROP SIZE**
Everyone agrees in this area that your power plane is now carrying the extra weight of the Floats and Float landing gear. You also have the additional drag of the Floats in the water. Change the prop to a larger diameter and smaller pitch. This gives you extra pull on the water.

4. **FLOAT TO AIRPLANE DISTANCE**
You need to keep the prop away from the water and water spray during taxiing, takeoffs, and landings. The Float to airplane distance is measured from the bottom of the prop arc to the top of the Floats. You should have a minimum of two (2) inches. See figure 2
5. DISTANCE BETWEEN FLOATS
To insure stability during windy conditions Float to Float distance is important. The wheel spacing that comes with the plane is the minimum Float spacing you can get away with. In windy conditions the minimum spacing may dip the wing in the water or, if not caught in time, roll your plane over when you make your turn into the wind for take off. A Float to Float spacing that equals 25% of the power planes wingspan will ensure stability on the water in any kind of wind conditions. I use between 25% and 33% Float spacing because I carry a glider on the back of my power plane. This has worked well for me. I have never had my airplane roll over or the wing go down in the water in any wind condition I have encountered since. (See Figure 3).

6. FLOAT PLACEMENT IN RELATIONSHIP TO THE AIRPLANE
This appears to be the major cause of most modelers' problems when their Float set-up experiences difficulty flying off the water. The Float attitude (looking at the plane from the side and the front) in relationship to the plane is incorrect. First, looking at the plane from the side, the Floats should sit parallel with the flight attitude of the airplane. (See Figure 2). Second, looking at the airplane from the front, the fuselage should be centered between the Floats and the Floats should be parallel with one another. See Figure 3. The blueprints usually do not identify the flight attitude in words, however, most fuselage side views are drawn in the flight attitude. So how do you know? In most cases the normal flight attitude of the airplane is that of the horizontal stabilizer. I draw the Float set-up on the fuselage blueprints two (2) inches below the prop arc and parallel to the horizontal stabilizer. If the leading edge of the wing is at a positive angle the set-up is complete. If however the wing angle is zero (parallel to the horizontal stabilizer) I then add 5/8 inches to the height of the front landing gear. This allows the wing to sit at approximately 3 degrees positive angle when the horizontal stabilizer is level. The positive wing angle lets the wing lift the airplane off the water and offsets the drag of the Floats. You now have enough information to draw the front and rear Float landing gear to full scale. Make
the Float gear to this drawing and all you have to do is attach it to our model and Floats, insure proper alignment, add water rudder, balance the model, and go fly.

7. ASSEMBLING THE FLOATS TO THE AIRPLANE
I first check that the work table is level. I then space the two Floats, using a ruler, the proper distance apart. With a small line level on the top of each Float, I support the front and aft of each Float with books so that the Floats remain level. I then get the fuselage with the landing gear attached (the nose gear landing mount is attached to the landing gear) and place it between the Floats supported by books. I place the airplane's C.G. over the Float step. Using a square I align the front Float gear (so it is perpendicular to the fuselage) and tape it to the Floats. I then put another level on the airplanes horizontal stabilizer and adjust the rear Float gear until the horizontal stabilizer is level and tape in place. Then I double check the C.G./step alignment. Next I mark the landing gear location on the Floats, drill the mounting holes and attach the Floats to the gear. I then take measurements at the front and rear of the Floats to check that they are parallel. If not, I adjust the landing gear on the nose bearing mount accordingly.

8. WATER RUDDER
You will need a means to steer the airplane during taxiing to and from the take off and landing spots. I have seen people fly successfully without a water rudder. However, I have not been so lucky. The wind blew my Kadet Senior everywhere except where I wanted it to go. Take the time to add a water rudder, it makes life a lot easier! You can attach a water rudder to the air rudder via a music wire or you can attach a water rudder to the aft end of the Floats. I have tried both and both set-ups work well. For a 40 size airplane it is suggested to have a water rudder of 3 square inches. See the article entitled "Floatplane Conversions and Gear" by John Sullivan - 27 hot Floatplane tips! in the October 1991 issue of Model Airplane News.

9. ENGINE IDLE
You need a reliable idle. There is no marked runway in Float flying so you have the tendency to take off and land in various locations on the pond, not to mention taxiing out and back from your takeoffs and landings. A dead stick on the water (for those off us who do not have a boat) means a long wait for the wind to bring it back to shore or you can swim out and get it. I know I have done both. This winter has been mild but swimming in October and November really wakes you up! When on water it is suggested you advance the idle a few clicks. This has made a big difference for me and to date has prevented the engine from cutting off from water spray or an unreliable idle. [Ed. Note: See my article (coming soon to the Float page) on two alternative methods of recovering a Float plane without swimming or a boat.]

10. ATTACHING THE FLOAT GEAR TO THE FLOATS
John Sullivan's article "Floatplane Conversions and Gear" shows many attachment schemes. I like using a tri-cycle nose gear bearing mount. See Figure 4.
It attaches to the Floats with four wood screws. The music wire passes through it and is held in place with a wheel collar. They allow easy attachment and parallel adjustment of the Floats.

11. TYPE OF FLOATS
You can now purchase Floats made of various materials, i.e. wood, plastic, foam and combinations of these or you can make your own. I find foam Floats easy to work with. They also have greater buoyancy ratings and can handle heavier loads. So if you plan to carry a glider up and/or camera equipment on your Float plane I strongly suggest solid foam Floats. If you do got this route I suggest [using a plywood strongback on each float] 1/4 inch thick X 1 1/2 inches wide times the length of each Float. This adds strength to the Floats and doubles as an attachment point for the Float landing gear.

12. LANDING GEAR
For a trike model just remove both the land nose and main gear and replace with your Float landing gear. Use the same diameter music wire as your land gear. A trike water set-up that I use is shown in Figure 5. It is not difficult to bend the wire if you use a tool like Higley's wire bender. After bending the various wire parts, assemble and wrap the connections with copper wire and silver solder. For a tail dragger remove the land gear and replace it with a rear Float gear as shown in Figure 5.
This will be your front Float attachment. You then have to add a plywood or hardwood landing gear support to the fuselage aft of the wing. This is your rear Float location. The rear gear I use is the same design as the rear Float gear in figure 5. You will need to add "N" bracing between the
13. BALANCE YOUR FLOAT PLANE
Just as you balance your model to fly off of land you must also balance your Float set-up.
Balance your Float plane setup at the same location you balanced the plane to fly off of land. If
you have to rebalance, and you probably will, because it is most likely that it will be tail heavy,
add the lead weights to the floats. This way you can switch from land to Float flying without
removing/adding weight every time. This is another place where foam Floats are nice because
you just drill a hole or two under the strongback at the tip of the Floats (if tail heavy), add the
lead and epoxy and you're finished.

14. NOW ENJOY FLOAT FLYING.

Robert's e-mail address is: fxxe90c@prodigy.com